NetCam SC

User's Manual

www.stardot.com

StarDot
Technologies

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Chapter 1 Configuration

Congratulations on your purchase of a StarDot NetCam SC network camera with integrated web server. The NetCam SC combines the best of the analog CCTV world (auto iris, day/night IR filter*, video out, 24VAC/12VC power inputs, I/O) with the best of the digital IP camera world (up to 5 megapixel, Power over Ethernet, integrated video motion detection).

With proper usage, NetCam SC will provide many years of quality video. We recommend that you read this manual carefully to completely understand the camera's capabilities. Throughout this manual, your NetCam SC camera will also be referred to as simply NetCam.

* Day/night IR filter available only on IR models.

1.1 Before You Start

This manual guides you through the basic setup procedure for the NetCam SC and provides a detailed resource of the camera's advanced options and capabilities.

Setting up NetCam SC consists of three steps. The first step is to configure the network settings. The second step is to configure NetCam to upload images to a web server (this step is optional). The third step is the physical installation of the camera.

1.2 What's Included and What's Required

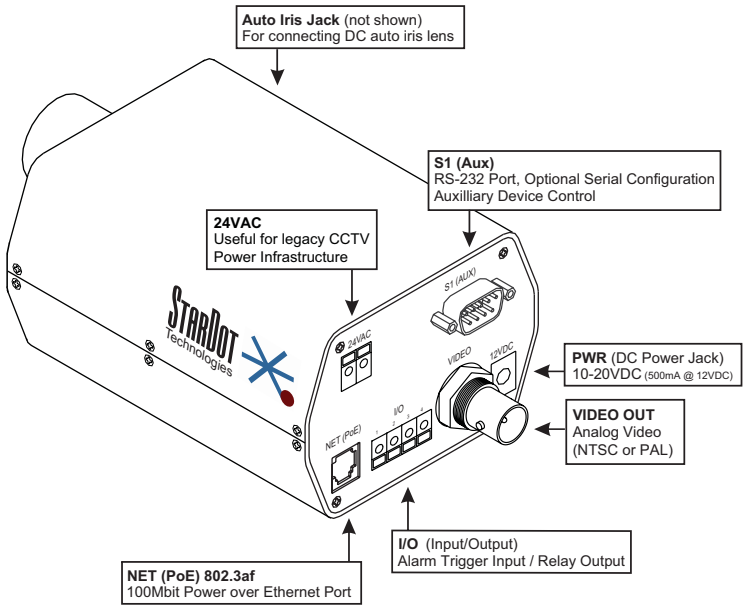
The basic package includes a NetCam SC camera, a lens and the StarDot Tools software (and this manual) on CD-ROM. Since the NetCam SC is a PoE device (Power over Ethernet), it is assumed that most users will provide their own CAT 5 or CAT 6 cable, as well as a PoE switch or power injector. StarDot optionally offers a wall mount, a power supply, a combination network/power cable and a null serial configuration cable. In order to use the NetCam SC, you will need the following:

- Power source (PoE, 12VDC or 24VAC)
- A computer – for configuring NetCam SC and for viewing video (viewing requires Java or ActiveX-enabled web browser)

  Note: *A computer is not necessary to operate NetCam, only to configure it.*

- Network connectivity (LAN, cable modem, DSL, T-1, Dial-Up Internet Account, Satellite Modem, etc.)

1.3 Parts of NetCam SC



1.4 Connecting NetCam SC to a Network

The StarDot Tools software can be used to find the camera's IP address or to configure the camera with the Setup Wizard (optional).

❶ Install the StarDot Tools software by inserting the CD-ROM and running `setup.exe` (it should run automatically).

❷ If your network has a router or server that auto assigns IP addresses (DHCP), StarDot Tools will find the camera's IP address and display it in the software. To access NetCam SC, simply double-click its IP address. If the IP address is displayed, skip to Chapter 3.

❸ If your network does not auto-assign IP addresses, you can assign a manual IP using a null serial cable. Connect one end of a null model serial cable to the **S1** port of NetCam SC and the other end into an available serial port on your PC.

❹ Connect NetCam SC into a PoE switch or injector with a standard CAT 5 network cable or with a StarDot Combo Ethernet/Power Cable.

❺ In StarDot Tools, click the Setup Wizard button.

❻ Follow the steps in the Setup Wizard. If you're unsure of some of the answers or you'd like more information on connecting NetCam to the Internet or your private network, read the next section, "An Overview of NetCam SC Connectivity".

1.5 An Overview of Network Connectivity

A LAN or network connection is the simplest configuration for NetCam SC. NetCam SC simply needs an IP address (and other networking parameters) to make the live images and configuration menus accessible from any web browser on the network. There are two ways NetCam SC can be assigned an IP address: automatically or manually.

Automatic IP Assignment (DHCP)

NetCam SC is shipped in an automatic IP assignment mode called DHCP (Dynamic Host Configuration Protocol). If your network has a DHCP server (in most cases, a router), it will automatically assign the necessary network parameters to NetCam SC. Before you can access the camera, you will need to know which IP address was assigned. Use the StarDot Tools software to find the camera's IP address.

Manual IP Assignment

If you want to assign the camera a permanent IP address, you will need the following information:

- IP Address (example: `192.168.1.5`)
- Subnet Mask (example: `255.255.255.0`)
- Gateway (example: `192.168.1.1`)
- DNS Servers (obtain from ISP)

If you are installing the camera on a company network, you will probably want to get this information from the system administrator.

The easiest way to configure NetCam SC manually is to connect the camera to a serial port on your computer. Plug one end of a null modem serial cable into the **S1** port on the back of NetCam SC and the other end into an available 9-pin serial port on the back of your computer. Use the included StarDot Tools software to configure the camera using the Setup Wizard.

If you don't have a serial port or are using a non-Windows machine, you have a few options.

If NetCam SC is connected to a network with a DHCP server and your computer is not running Windows, you can log into your router (or whatever is acting as your DHCP server) and view the DHCP clients table. NetCam SC will have a MAC address starting with 00:30:F4. Take note of the IP address and enter it in your web browser. Click on the configuration link, visit the network tab and assign the camera a manual IP address (outside of the router's DHCP range).

If NetCam SC is connected to a network without a DHCP server (IP addresses are not automatically assigned) and your computer is not

running Windows, you'll have to manually assign the camera an IP address. This requires terminal emulation software and the included null serial cable. On a Macintosh or on a Windows computer without a serial port, you'll need a USB RS-232 adapter.

To talk directly to the camera via the included serial cable, set your terminal software to a bitrate of 38,400 (8/N/1). Log in with username `admin`, password `admin` and use the following commands to assign the camera a temporary IP address. Once the IP has been assigned, browse to the camera with a web browser and configure NetCam SC so it has a permanent static IP address (see Chapter 3.8).

In the following example, NetCam SC is being assigned a temporary IP address of 192.168.0.2 via a terminal program connected to the S1 port on the back of NetCam SC:

```
ifconfig eth0 192.168.0.2
route add -net 192.168.0.0 netmask 255.255.255.0 eth0
```

Remember, once you can reach camera via its temporary IP address, you'll want to immediately assign it a permanent static IP address in the network configuration menu.

Chapter 2 Installation

Before installing the camera in its final location, it is important to configure and test it first (see Chapter 1).

2.1 Installing NetCam SC

Measure the distance from the camera to the nearest Ethernet hub or switch. This distance should not exceed 330 feet. If you wish to extend the distance further than 330 feet, you can add an Ethernet hub or switch.

There are three ways to power NetCam SC. This allows you go install the camera in virtually any existing infrastructure. **NOTE: Only use one method to power the camera . Do not plug two or more power sources into the camera simultaneously.**

Power over Ethernet (PoE)

Run standard CAT 5 or better Ethernet cable from a PoE hub/switch (or PoE power injector) into the NET jack on the back of NetCam SC. NetCam SC will run off the PoE power running in the CAT 5 cable. No other power source is required.

Separate Ethernet and Power

If you decide not to use PoE, you can connect one end of a CAT 5 or better Ethernet cable into a hub/switch and the other end into the **NET** jack on the back of NetCam SC. Plug a 12VDC 1A power supply into the back of NetCam SC (or you may use a 24VAC power supply and connect it to the input marked 24VAC).

StarDot's Power/Network Cable

If you choose not to power NetCam SC via PoE and you still want the take advantage of a single cable run, StarDot provides Power/Network cable that allows you to run both power and data in the same cable. Visit http://www.stardot.com for more information.

2.2 Outdoor Environment

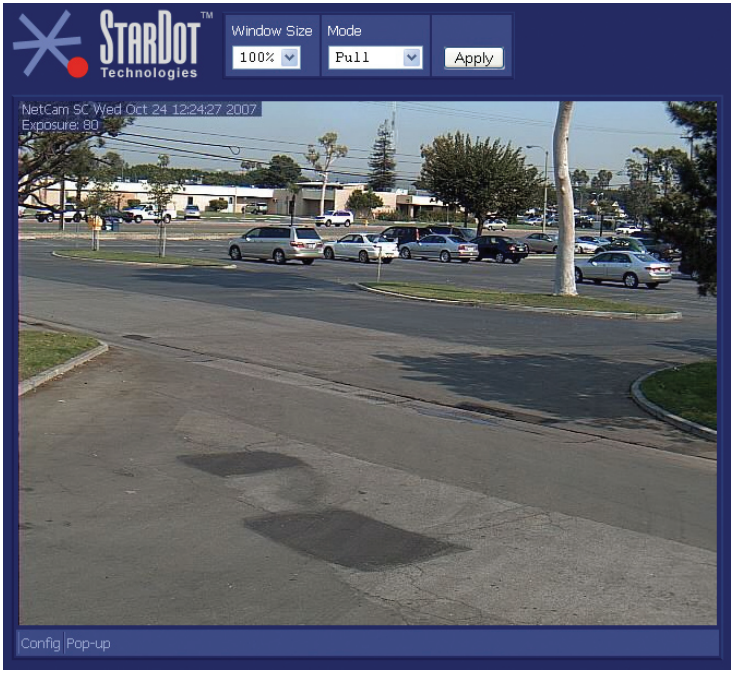
To mount NetCam SC outdoors, it must first be encased in an outdoor enclosure (different models are available from StarDot Technologies, see http://www.stardot.com/sc). Install the camera in an outdoor enclosure and adjust the internal mount so the lens is up against the enclosure window. This helps to reduce glare and interior reflections.

Determine where NetCam SC will be pointing and where you'd like to mount it. The outdoor enclosure can be mounted on a horizontal or vertical surface. When aiming the camera, factors such as sun travel and amount of visible sky can vastly affect the quality of the image. For imaging tips, see Section 4.1.

Chapter 3 Accessing NetCam SC

3.1 Viewing NetCam SC's Images

Any Java-enabled browser can be used to view the live images. Type NetCam SC's IP address in your browser's address bar (example: `http://192.168.1.5`). Or use StarDot Tools to Find the camera's IP address.



Window Size

For most viewing, the window size should be set to 100%, which is a pixel to pixel match of the image resolution. If you select 50%, the width and height will be browser resized to 50% of the actual image resolution. If you select 200%, the width and height will be browser resized to 200% of the actual image resolution. This does not affect the actual image resolution which is set on the image configuration menu (Section 3.3).

Mode

This determines which method is used to watch the live video:

Pull - Java applet "pulls" the live images via web port (usually 80)

Push - Java applet receives motion JPEG stream via port 8001

ActiveX - receives motion JPEG stream via port 8001

.NET - receives motion JPEG stream via web port (usually 80)

3.2 NetCam SC's Configuration Menus

Virtually any web browser can be used to access NetCam SC's configuration menus. To access these menus, type NetCam SC's IP address in your browser's address bar (example: `http://192.168.1.5`). This will bring up the live image page. Click on the Configuration link. You will be prompted for a User Name and Password. Use `admin` for both.

Tip: *We highly recommend that you change the default password. To do so, see Section 3.10.*

3.3 Image Properties

All image-related configuration options are located on the Image Properties page. After making changes, click the Apply button to save new settings in the camera. Each section can be collapsed and expanded. If a section is collapsed, click to expand.

PROCESSING

Resolution

Resolution is the dimensional size of the NetCam SC image, measured in pixels, horizontal by vertical. The higher the resolution, the larger the picture appears in your browser, and the longer it takes to download. Some resolutions, such as portrait and HD, crop the image. The resolution marked with an asterisk (*) denotes the default quarter resolution image.

Tip: *As with most digital cameras, NetCam SC achieves the highest quality and clearest images at quarter resolution. This is due to the way color is calculated with digital image sensors. The largest "high quality" image on the NetCam SC 5MP is 1296x960.*

Saturation

This represents the amount of color in the image. The higher the number, the more saturated the color.

Haze

This represents the amount of haze subtraction. The higher the value, the more haze is subtracted and the image results in higher contrast. Using the Auto Haze function is recommended over setting the haze manually.

Auto Haze

Haze subtraction is automatically determined by the camera. Enabling Auto Haze is recommended.

JPEG Quality

The JPEG Quality is a balance between lossy image compression and image quality. The higher the number, the less compression artifacts in the image, but the bigger the file size. **A value higher than 90 is not recommended, as it greatly increases the file size with very little noticeable difference in image quality.**

Sharpen

When enabled, software sharpening is performed on the live image. For the best image quality, Sharpen should be enabled.

EXPOSURE

Auto vs. Manual

Unless you have a controlled (fixed) lighting condition, you will almost always want to leave Auto Exposure enabled.

Auto Exposure

Enabling Auto Exposure causes NetCam SC to automatically adjust the image exposure based on the overall brightness of the image.

The following functions are only implemented when Auto Exposure is enabled.

- **Brightness** - The higher the number, the brighter the picture. This is the target for the auto exposure code.
- **Sync**- Fluorescent lighting refreshes at 60Hz or 50Hz, depending on what country you live in. This may interfere with the camera's exposure. Set the sync to the appropriate value for your area (example: U.S. is 60Hz). If you are pointing the camera outdoors or do not use fluorescent lighting, turn this option off.

Manual Exposure

Enabling Manual Exposure causes the camera to expose images at the value placed in the Exposure field. Keep in mind that using manual exposure is not advised for outdoor imaging, since the light conditions are constantly changing. You may opt to use manual exposure indoors if your lighting conditions do not change. Here are some sample values and their fractional and decimal equivalents:

48 = 1/1000 second (0.0001)
96 = 1/500 second (0.002)
248 = 1/200 second (0.005)
480 = 1/100 second (0.01)
800 = 1/60 second (0.1666)
960 = 1/50 second (0.020)
1600 = 1/30 second (0.0333)
3200 = 1/15 second (0.0666)*
6000 = 1/8 second (0.125)*
12000 = 1/4 second (0.25)*
24000 = 1/2 second (0.5)*
32767 = 0.68 seconds (maximum exposure)*
** may introduce pixel noise*

EXPOSURE GRID

When Auto Exposure is enabled, NetCam SC adjusts the exposure of the image based on the average brightness of the pixels located in the selected regions in the Exposure Grid. If you want the camera to determine the exposure based on only the sky, you would select the squares that apply to the sky (click the View Grid button to see the grid over the image). Conversely, if you'd like the exposure to be determined by the foreground, select only those squares. This is comparable to the spot exposure on a traditional camera.

ADVANCED

- **Auto Iris**- Only enable this option if a DC Auto Iris lens is connected into the camera. If your camera does have a DC Auto Iris lens connected, you may optionally enable this option when the

camera is pointing outdoors.

- **Back Light** - Backlight compensation (BLC) adjusts the picture in situations where a bright light source, such as window, is causing the image to be improperly exposed.
- **Low Light Presets** - There are a lot of controls in determining how the camera behaves in low light conditions. To simplify low light use, a number of Low Light Presets are available to instantly configure the camera as required. The presets automatically set all the other controls. If you'd like to manually set the advanced controls select "Manual" in the Low Light Presets dropdown.
- **Exposure Limit** - The camera will not expose the image sensor above this value. The default is 32767 (about 0.7 seconds). A higher value will make the camera more light sensitive in low light at the expense of motion blur.
- **Allow Extended Exposures** - In darker lighting conditions, a longer exposure produces a brighter image. A longer exposure also produces an image where objects in motion may appear blurry. If your application requires the best possible image quality and motion blur is not a concern, enable Allow Extended Exposures and set the Exposure Limit to a high value (up to 32767). If your application requires capturing images of people or objects in motion, disable Allow Extended Exposures.
- **Automatic Gain Control (AGC)** - The picture is digitally amplified in low light conditions or in situations where the exposure is limited to reduce motion blur. Enabling AGC may introduce image noise.
- **AGC Limit** - The higher the limit, the more digital amplification occurs (assuming it's necessary). If you want to limit the digital gain to reduce noise on the image, reduce this value.
- **Pixel Rep** - Groups pixels together for better light sensitivity, at the expense of image clarity.
- **DNR (Digital Noise Reduction)** - Reduces image noise using digital algorithms.
- **Image Speed** - Determines when low light gain is initiated in relation to the exposure.
- **Low Light** - In low light conditions, the analog low light mode of the image sensor is enabled. Enabling Low Light may introduce image noise.
- **Alternate YUV** - Uses non-standard algorithms to process color, allowing for improved light sensitivity.

MISCELLANEOUS

Frame Skip

To lower the frame rate (and bandwidth), increase this value. A value of 0 means full frame rate, a value of 1 means skip every other frame, a value of 2 means skip every two frames, etc.

LED

The LED indication on the front of the camera can be configured in a number of different ways:

- **Off** - LED is always off. Useful when you do not want the camera to be seen at night or if you are experiencing a visible reflection in a window.
- **Green-Yellow Active** - LED remains green until image activity occurs (viewing, recording, FTP, etc.), in which case it momentarily blinks yellow.
- **Green-Red Motion** - LED remains green until internal video motion is detected, in which case it momentarily blinks red.
- **Green-Red-Yellow** - A combination of Green-Yellow Active and Green-Red-Motion.

Video Out

Controls video out BNC port on the back of the camera. It can be turned off (no video out) or set to NTSC or PAL. When set to NTSC or PAL, the camera's video can be viewed with any standard video monitor. Note: the video resolution will be scaled up or down to the maximum NTSC or PAL resolution.

IR (only available on IR models)

This determines how the mechanical IR (infrared) filter behaves.

- **Off** - The camera will only see visible light.
- **On** - The camera will see both visible and infrared light.
- **Auto** - The camera will automatically determine what position the IR filter should be in (IR is normally only needed in low light situations). If you plan on using the IR mode (on or auto), an IR illuminator is recommended.

COLOR BALANCE

Auto Color Balance

Enabling Auto Color Balance causes NetCam SC to automatically adjust the color balance of the image based on the content of the image. In most situations, you will want Auto Color Balance enabled.

Auto Color Balance Type

- Average - An average of the entire image is used to determine color balance.
- Bright - Only bright areas are used to determine color balance.
- Spot - Only spot areas are used to determine color balance.
- Automatic - The camera automatically selects the best method to use.

R - This represents the amount of red skew in the image.

G - This represents the amount of green skew in the image.

B - This represents the amount of blue skew in the image.

The recommended setting is Auto Color Balance with Average selected.

Manual Color Balance

Enabling Manual Color Balance causes the camera to use the manual Red, Green and Blue values to set the color balance of the image. You may want use manual color balance if you have a fixed lighting situation.

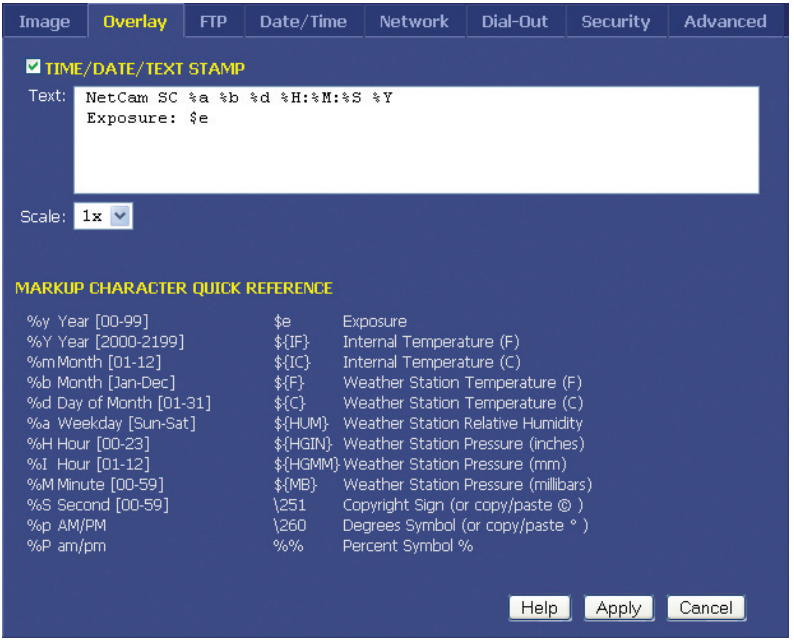
R - This represents the amount of red in the image.

G - This represents the amount of green in the image.

B - This represents the amount of blue in the image.

3.4 Overlay Properties

The Overlay Properties allow you to edit the text displayed on the image.



TIME/DATE/TEXT STAMP

Text

Any text entered into this field will be stamped onto the live image. Camera location and copyright information are two examples. In addition to static text, the current date and time, as well as internal camera parameters, can all become part of the text on the live image. This is handled through markup characters. For instance, `%d` inserts the current day of the month on the live image. There is a complete list of markup characters below and a mini reference on the Overlay page itself.

Default: `NetCam SC %a %b %d %H:%M:%S %Y`
`Exposure: $e`

Scale

The size of the font can be scaled from 1x (smallest size) to 4x (largest size). The larger fonts sizes are useful for high resolution images that are being resized smaller on a web page.

Markup Character Reference

All of the following markup characters can be used in the text overlay.

Additionally, any date/time markups (preceded by the % character) can be used to compose the filenames in the FTP Properties Page, which is very useful for archiving images with unique filenames (based on the current date and time, for instance).

Date Markups

%Y	Year, Four-Digit [2000-2199]
%y	Year, Two-Digit [00-99]
%m	Month, Numerical [01-12]
%B	Month, Full [January-December]
%b	Month, Abbreviated [Jan-Dec]
%U	Week of Year (Starting with Sunday) [00-53]
%W	Week of Year (Starting with Monday) [00-53]
%d	Day of Month [01-31]
%w	Day of Week, Numerical (Sunday=0) [0-6]
%u	Day of Week, Numerical (Monday=1) [1-7]
%A	Day of Week, Full [Sunday-Saturday]
%a	Day of Week, Abbreviated [Sun-Sat]
%j	Day of Year (Julian Day) [001-366]
%p	AM/PM, Uppercase
${Z}	Time zone

Time Markups

%H	Hour, Military [00-23]
%I	Hour, Standard [00-12]
%M	Minute [00-59]
%S	Second [00-59]
$[	Milliseconds [000-999]

Date & Time Shortcut Markups

%D	Date String [mm/dd/yy]
%r	Time String [HH:MM:SS AM/PM]
%T	Time String, Military [HH:MM:SS]

Symbol Markups

\260	Degree Sign, º

\251	Copyright Sign, ©
\256	Registered Sign, ®
\261	Plus-Minus Sign, ±
%%	Percentage Character, %

Camera Markups

$e	Camera Exposure
${IF}	Internal Camera Temperature, in Fahrenheit
${IC}	Internal Camera Temperature, in Celsius
${F}	Weather Station Temperature, in Fahrenheit
${C}	Weather Station Temperature, in Celsius
${HUM}	Weather Station Relative Humidity
${MB}	Weather Station Pressure in Millibars (hPa)
${HGIN}	Weather Station Pressure in Inches of Mercury
${HGMM}	Weather Station Pressure in Millimeters of Mercury
$n	Frame Number
$u	Camera Uptime

NetCam SC supports much of the ISO 8859-1 character set, which is very useful for adding foreign language text to NetCam SC's overlay. For a list of characters, visit http://www.stardot.com/netcam/netcam-overlay.txt

In most cases, you can also copy and paste characters from other applications.

3.5 FTP Properties

The FTP Properties instruct NetCam SC to upload images to a remote server. After making changes, click the Apply button to save the settings in the camera.

FTP Upload

FTP stands for File Transfer Protocol, one of the most popular methods for transferring files over the Internet. In addition to camera serving images from its internal web server, it can also upload images to an external web server. This is useful if you plan on having a large number of visitors viewing the live images or if you'd like to archive every image the camera takes. To enable image uploads, check FTP Upload on and fill out the options below.

Required Fields

Hostname

The hostname is the name of the server where you'd like the camera to upload images to. It can be a machine name or IP address. Do not include the `http://` or `ftp://` header or a path.

Example: `example.com` or `ftp.example.com`

Username

This is the username or login name assigned to you by your hosting company.

Password

This is the password assigned to you by your hosting company.

Path/File

This field combines two elements, the image filename, preceded by an optional path or directory. Consult with your hosting company to determine if you need to specify a path. If you don't, you simply put the desired name of the image file here.

Example Without Path: `camera.jpg`
Example With Path: `/html/images/camera.jpg`

Advanced Fields

Rotating Archive

If enabled, the camera will use a renaming scheme to store the current 10 images on your server. A hyphen, followed by the archive number (0-9) is automatically appended to the end of the filenames.

Default: Off

Passive Mode

If NetCam SC is behind a proxy server, enable passive mode. If you are unsure if you need passive mode, it is usually safe to enable it anyway.

Default: On

Timeout

If the FTP transfer is unsuccessful, Netcam will abort and re-initiate the process after the specified amount of seconds.

Default: `120`

Delete Before Rename

NetCam SC employs a file renaming scheme, which greatly reduces the possibility of file collisions between the camera uploading an image and viewers downloading the image. The image is uploaded with a `.tmp` extension. Once uploaded the tmp file is renamed without the `.tmp` extension. Certain FTP/Web servers do not allow a file to be renamed to a filename that already exists. To get around this problem, enable Delete Before Rename.

Default: Off

IIS 4.0

Some FTP servers lock a file when a file with the same filename is constantly uploaded and renamed. If you have problems seeing your image update on your web site, try enabling the IIS 4.0 option. This option is only valid if Delete Before Rename (above) is also enabled.

Default: Off

Secondary Path/File

NetCam SC can optionally upload the image with a separate path and/or filename from the Path/File above. This provides a very convenient way to archive images on your server while still maintaining a statically named live image. One way to do this is to include date/time markup characters as part of the filename. The current upload time of the image will become the filename.

For example, the filename `%Y-%m%d-%H%M%S.jpg` automatically translates to `2007-11-01-153015.jpg` if the date and time of the upload is November 1, 2007 at 3:30:15 PM.

Tip: *For a complete list of Date/Time markup characters, click the Help button on the Overlay page.*

Example Without Path:

```
netcam-%Y-%m%d-%H%M%S.jpg
```

Example With Path:

```
public_html/netcam-%Y-%m%d-%H%M%S.jpg
```

Only the characters beginning with the percentage symbol (`%`) are valid. It not advisable to use date/time characters that insert `/ \ :` or space characters, as this can confuse the FTP/Web server.

Current IP Link Path/File

If NetCam SC is using an external modem to dial out to an ISP, it will most likely be assigned a different IP address every time it connects. This makes it next to impossible to access the camera directly from a browser since its IP address is not known. To eliminate this problem, the camera can upload a small web page every time an image is uploaded. The web page contains the current IP address of the camera so you can configure the camera remotely. Clear this field if you don't want this file to be uploaded.

Default: `ip.html`

Schedule

Scheduling tells NetCam SC when and how often to FTP images to your server.

Delay

This tells the camera to delay a specified number of seconds between FTP image uploads. The speed at which the camera can upload varies on the image resolution, amount of JPEG compression, Internet connection and network congestion. Keep in mind that the overhead of FTP doesn't allow for the same update rates that you see when accessing the camera directly with a browser or through NVR software.

Default: `30`

Upload Window

NetCam SC can upload images 24 hours a day, seven days a week, or you can set whatever time window and days of the week you like. Use military time for the beginning and ending window times.

Example: You can configure NetCam SC to only upload Between 07:30 and 18:30 only on Monday, Tuesday, Wednesday, Thursday and Friday.

How do I display the live image on my web site?

The simplest way to add the live image on one of your web pages is with the image tag: `<img src="camera.jpg">`

To see the current live image, the visitor would have to hit the refresh button. This reloads the web page and will display the current live image, assuming a new image has already uploaded.

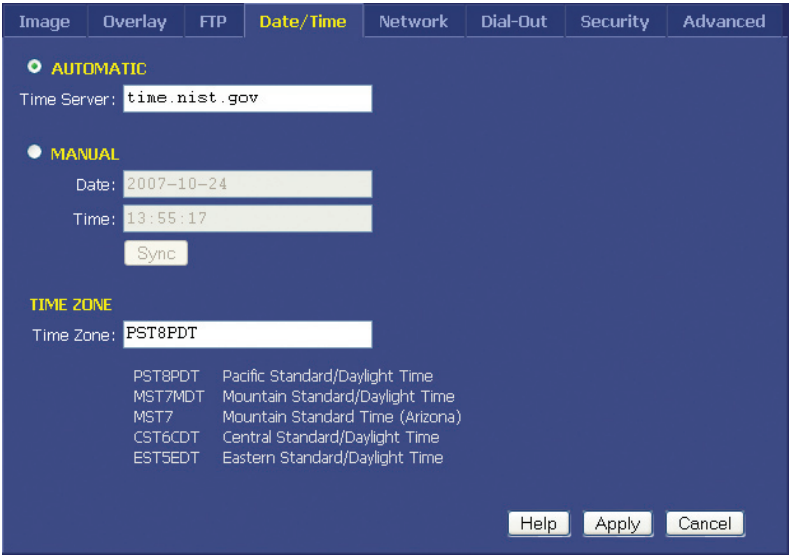
You can add a meta tag to the `<head>` section of your web page that tells the browser to refresh the web page at specified interval: `<meta http-equiv="refresh" content="30">`

If you prefer a slicker solution that doesn't require refreshing the whole page and visibly redrawing the live image, StarDot provides a free Java applet. You can download the Capture Client Java applet and instructions here:

`http://www.stardot.com/sc/downloads.html`

3.7 Date/Time Properties

The Date/Time Properties allow you to set the camera's date and time. After making changes, click the Apply button to save the settings.



Setting the Date and Time

Automatic vs. Manual - For the most accurate date & time, having the camera automatically synchronize with a network time server is recommended.

Automatic Time Set

When Automatic time synchronization is enabled, the camera will query a network time server and synchronize the camera's date and time, usually accurate to within seconds or less. This will happen every time the camera is powered on or rebooted, provided it is connected to the Internet or a network with a time server.

- **Time Server** - The name (or IP address) of a time server is entered here. Some popular ones include:

```
time.nist.gov
tock.usno.navy.mil
time-b.nist.gov
```

Note: While these time servers have proved reliable over the years, there is no guarantee that they will always be available to the public.

Manual Time Set

If you don't have access to a time server, you may opt to manually set the camera's clock. You can do this in one of two ways. Using the Sync button, you can synchronize the camera's clock to your PC's clock. You may also manually modify the time and date in the Date/Time box. In either case, be sure to hit the Apply button after you've set the time.

TIME ZONE

NetCam SC integrates your current time zone into the time/date string and can even automatically adjust for daylight savings time. Type in the time zone code from the list on this page. If your time zone is not listed, enter your abbreviated time zone followed by the number of hours you are behind GMT (if you're ahead of GMT, add the "-" character before the value).

HST10	Hawaiian Standard Time
AT10ADT	Aleutian Standard/Daylight Time (Alaska, parts)
YST9YDT	Yukon Standard/Daylight Time (Alaska, parts)
PST8PDT	Pacific Standard/Daylight Time
MST7MDT	Mountain Standard/Daylight Time
MST7	Mountain Standard Time (Arizona)
CST6CDT	Central Standard/Daylight Time
EST5EDT	Eastern Standard/Daylight Time
AST4ADT	Atlantic Standard/Daylight Time
NST3:30NDT	Newfoundland Standard/Daylight Time
WET0WETDST	Western European Standard/Daylight Time
PWT0PST	Portuguese Winter/Summer Time
MEZ-1MESZ	Mitteleuropaeische Zeit/Sommerzeit
MET-2METDST	Middle European Standard/Daylight Time
SAST-2SADT	South African Standard/Daylight Time
JST-9	Japan Standard Time
WST-8:00	Australian Western Standard Time
CST-9:30	Australian Central Standard Time
CST-9:30CDT	Australian Central Standard/Daylight Time
EST-10	Australian Eastern Standard Time
EST-10EDT	Australian Eastern Standard/Daylight Time
NZST-12NZDT	New Zealand Standard/Daylight Time

3.8 Network Properties

The Network Properties page contains all the IP configuration information for setting up NetCam SC on a network. After making changes, click the Apply button to save the settings in the camera.

Ethernet

If your network is Ethernet-based (LAN, cable modem, DSL), use the **NET** port on the back of NetCam SC to access the camera. The first step to network access is assigning NetCam SC an IP address. There are two ways in which this can be done: automatically (DHCP) or manually.

IP Assignment

DHCP

By default, NetCam SC boots up in DHCP mode, meaning that it probes the network for a DHCP server. If there is a DHCP server on the network, the camera is automatically assigned an IP address, subnet mask, gateway, and name servers. No manual configuration is needed. One negative of DHCP mode is not knowing which IP address the camera was given. Use the StarDot Tools software to find DHCP-assigned cameras on your local network.

Manual

If you'd like to manually assign an IP address, set the camera to Manual and provide the following information:

- **IP Address** - The IP address you'd like to assign the camera.

Consult your network administrator to determine which IP address to use. If you are setting up the camera behind a residential gateway or cable/DSL router, your IP address will probably be something similar to `192.168.1.5`.

- **Subnet Mask** - Find out your netmask from your network administrator. If you're on a private network, your netmask will almost always be `255.255.255.0`.
- **MAC Address** - This is the factory-set Ethernet address of the camera. It also serves as the Camera ID (serial number). It cannot be changed.

Network

Hostname

Alphanumeric name of the camera that can get linked to its IP address. This is disabled if DHCP is enabled.

Default: `NetCamSC`

Gateway

In most cases, this is a machine name or IP address that serves as a gateway to the Internet. If the camera is on a private network behind a router/gateway, you would enter the IP address of the router/gateway. This is disabled if DHCP is enabled.

Domain Name Servers (DNS)

Domain name server IP address. This is critical if your FTP server and/or time server is entered as a domain name and not an IP address. Check with your ISP to determine your name servers (you can list up to three). This is disabled if DHCP is enabled.

Web Server Port

The default web server port is `80`. A situation that calls for changing the port number is if you're hosting one or more cameras behind a router that supports port forwarding. This allows you to access multiple cameras behind a single public IP address.

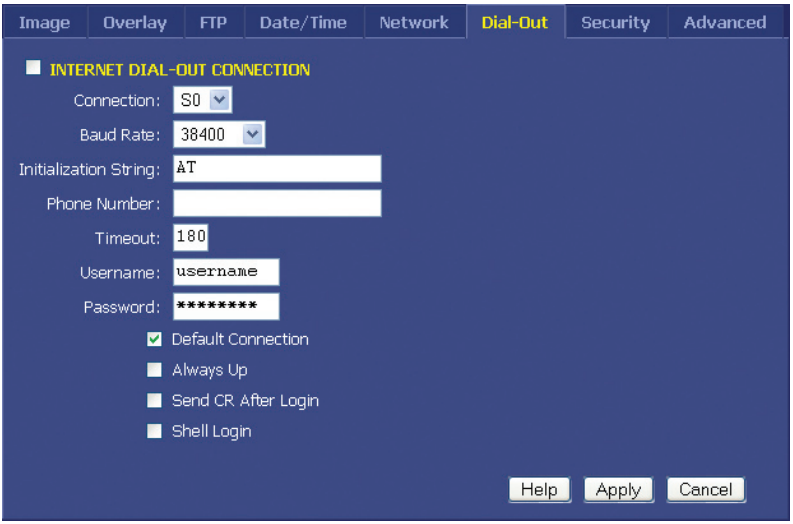
Example: *Assign the camera a web server port of 8085. In your router, under the port forwarding section, route port 8085 to the camera's IP address.*

Use caution when changing the web server port number. If it's anything but 80, you will need to add `<:port number>` to the end of the IP address when browsing (example: `http://192.168.1.5:8085`).

Default: `80`

3.9 Dial-Out Properties

The Dial-Out Properties page contains all the ISP dial-up configuration information for setting up NetCam SC on a dial-up modem. After making changes, click the Apply button to save the settings in the camera.



Internet Dial-Out Connection (PPP)

If NetCam SC's primary connection to the Internet will be a dial-up modem connection to the Internet, enter your ISP (Internet Service Provider) account information here.

Check this option on if you'd like the camera to use an external modem to dial the Internet.

Baud Rate

This represents the speed or baud rate at which the camera will communicate with the external modem. For most dial-up accounts, a baud rate of 38400 or 19200 works best.

Default: `38400`

Initialization String

This is a string that configures your modem before dialing the Internet. The default string works fine in most cases.

Default: `AT`

Phone Number

The phone number of the ISP (Internet Service Provider). You can

embed special characters in the phone number.

, = pause one second
= same as # button on phone
* = same as * button on phone

Timeout

NetCam SC will attempt to dial up the ISP for the specified number of seconds. If NetCam SC is unable to connect during this time period, it will stop and start over again.

Default: 180

Username

The username or login assigned to you by your ISP.

Password

The password assigned to you by your ISP.

Default Connection

Enabling this option makes the ISP dial-out connection NetCam SC's default connection to the Internet.

Default: On

Always Up

If enabled, NetCam SC will attempt to stay continuously connected to the Internet. If disconnected, it will automatically attempt to reconnect. If NetCam SC is configured to upload images to a server via FTP, it is not necessary to enable this option; NetCam SC will automatically attempt to dial into the Internet when an image is scheduled to upload if dial-out is enabled.

Default: Off

Send CR After Login

This advanced ISP option tells NetCam SC to send a CR (Carriage Return) after logging in. Most ISP's do not require this.

Default: Off

Shell Login

This advanced ISP option tells NetCam SC to perform a shell login. Most ISP's do not require this.

Default: Off

3.10 Security Properties

The Security properties page contains user/password information for securing NetCam SC from unwanted visitors.

NetCam SC Users

NetCam SC has its own multi-user capable, password protected operating system. By default, the live images can be viewed by anyone and only the configuration pages are password protected. However, these options can be changed.

admin - The *admin* user has configuration and viewing rights. **It is strongly recommended that you change the default password (initially "admin") to something else.** This will prevent anonymous users from logging into the camera and making changes. Choose a password that cannot be easily guessed. The password can be a combination of alpha and numeric characters, upper and lowercase (maximum 8 characters).

Tip: *Use a password that cannot be easily guessed (maximum 8 characters).*

viewer - The *viewer* user only has viewing rights (this user cannot access the configuration menus). By default, the *viewer* user has no password. This allows anyone to view the images on the camera without being prompted for a password. If you want to block public access to the live image, you will need to change the password for the *viewer* user.

To modify the password of an existing user, click on the user name and then type in a new password in the password field (retype it in the verify password field). Then click the Add/Modify button.

Tip: *Do not forget your password. If you do, you will have to open the top half of the camera case and press the Defaults button on the circuit board.*

Adding a New User

To add a user to the Users list, type in the desired username in the Name field. Type and retype a password in the Password fields. Click the Add/Modify button. New users will only have viewing rights; only the *admin* user can make configuration changes in the camera.

Deleting a User

To remove a user from the Users list, click on the desired username and click on the Remove button. Note: The default users, *admin* and *viewer*, cannot be removed.

3.11 Advanced Menus

The advanced menu allows you to configure some advanced features inside the camera such as Triggers and Dynamic DNS support.

3.12 Miscellaneous

Reboot Camera

Click this to reboot the camera.

Upgrade Firmware

Allows you to select a new firmware and upgrade the camera. You can also use the StarDot Tools software to upgrade the firmware. It is recommended that you clear the configuration settings before upgrading (see the manual config section).

3.13 Manual Config

Configuration Files

This advanced menu provides access to all of the configuration files in NetCam SC. We recommend that you do not edit these files unless you are well versed in Linux and the NetCam SC camera settings.

3.14 PTZ

For future use.

3.15 Dynamic DNS

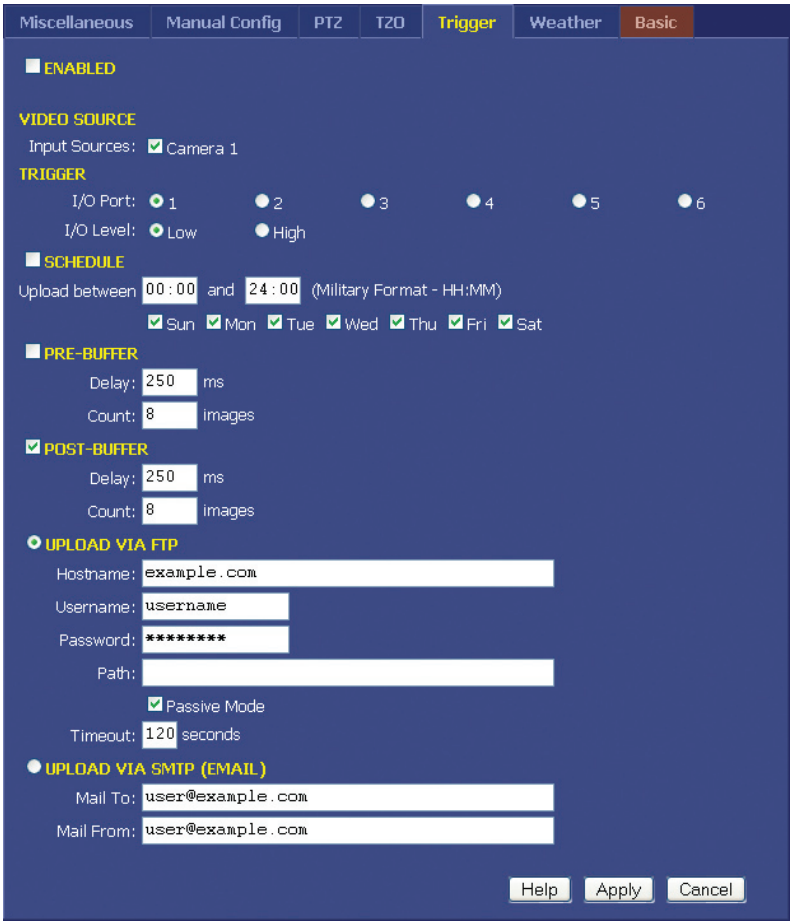
If NetCam SC is behind a DSL or cable modem connection and the public IP address changes, you can use tzo.com as a dynamic DNS service. This maps your dynamic (i.e. always changing) IP address to a static hostname of your choice (i.e. yourcompany.stardotcams.com or yourname.remotecam.com).

Why is knowing your public IP address valuable? If your router is configured to "port forward" port 80 to the camera's local IP address, you can browse to the camera directly from anywhere on the Internet. This is useful for viewing the camera live and making configuration changes from a remote location. For information on configuring port forwarding on a router, visit http://www.portforward.com, click on routers, select your model and click on "Default guide".

To set up a TZO account, visit http://stardot.tzo.com. After you've signed up, enter the appropriate information in either NetCam SC or your router (if it supports DDNS).

3.16 Trigger Properties

The trigger menu allows you set up NetCam SC to capture and upload a series of images based on a triggered event using the input ports on the back of the camera.



Trigger Overview

By connecting an alarm system, motion detector or other type of sensor to the back of NetCam SC, it is possible to gather a series of images when the sensor "triggers" the camera.

TRIGGER

I/O Port

Select with I/O port your trigger source is connected to. NetCam SC only has I/O port 1.

I/O Level

Select the state of the trigger source's output.

SCHEDULE

NetCam SC can wait in trigger-capture/upload mode 24 hours a day, seven days a week, or you can set whatever time window and days of the week you like. Use military time for the beginning and ending window times.

Example: You can configure the camera to only upload Between 07:30 and 18:30 only on Monday, Tuesday, Wednesday, Thursday and Friday.

PRE-BUFFER

Pre-buffered images are images that are stored before the event trigger occurs. For example, if you connect an alarm system to the camera with 10 image pre-buffering enabled, 10 frames of video that occurred before the alarm was triggered will be captured/uploaded.

If pre-buffering is enabled, the camera will continuously buffer images in a rotating loop. This will affect the video speed if you'd like to view live streams at the same time. Most applications don't require pre-buffering. Only enable this option if you require video frames before the trigger takes place.

Delay

The number of milliseconds to delay between image captures. For the fastest possible frame rate, set this to 33. Here are some example frames rates for a single triggered video source:

33 ms = 30 Frames Per Second (Max Speed)
250 ms = 4 FPS
1000 ms = 1 FPS

Count

The number of pre-buffer images to store. There is a finite amount

of memory in which to store images. Keep the total number of pre and post-buffer medium resolution images to below 50, even less for full size images.

POST-BUFFER

Post-buffered images are images that are recorded after a triggered event occurs. For example, if you connect a door sensor to the camera with 20 image post-buffering enabled, 20 images will be captured/ uploaded after the door opened.

Delay

The number of milliseconds to delay between image captures. For the fastest possible frame rate, set this to 33. Here are some example frames rates for a single triggered video source:

33 ms = 30 Frames Per Second (Max Speed)
250 ms = 4 FPS
1000 ms = 1 FPS

Count

The number of post-buffer images to store. There is a finite amount of memory in which to store images. Keep the total number of pre and post-buffer medium resolution images to below 50, even less for full size images.

UPLOAD VIA FTP

If you'd like the event-triggered image captures to be uploaded to an FTP server, select this option. The "Upload via FTP" parameters are independent of the regular image FTP parameters (see Chapter 3.5).

Hostname

The hostname is the name of the server where you'd like NetCam to upload images to. It can be a machine name or an IP address.

Example: `example.com` or `ftp.example.com`

Username

This is the username or login name assigned to you by your hosting provider.

Password

This is the password assigned to you by your hosting provider

Path

Specify the path on your FTP server where you'd like the images stored. There is no need to specify a filename. NetCam SC automatically

creates sequential filenames (image0-000.jpg, image0-001.jpg, image0-002.jpg, etc.).

Passive Mode

If NetCam SC is behind a proxy server, enable passive mode. If you are unsure if you need passive mode, it is usually safe to enable it anyway.

Timeout

If the FTP process hasn't completed within the time specified here, the Express 1 will attempt to restart the process.

Default: `120`

UPLOAD VIA SMTP (EMAIL)

If you prefer the event-triggered image captures be e-mailed, select this option. If you've enabled a large number of images, this can add up to a large e-mail attachment.

Mail To

Specify the e-mail address you prefer NetCam to send the images to.

Mail From

Specify a "from" e-mail address. This can be created.

TRIGGER SENSOR CONNECTOR

The I/O connector contains one opto-isolated trigger input and one relay connection.

Pins 1 and 2 are an opto-isolated input, providing 2500VRMS isolation. To trigger, apply positive voltage to pin 1, and negative or ground to pin 2. The trigger voltage should be 3.5VDC to 12VDC, 1.4mA minimum. You may connect directly to a 12VDC alarm system, door sensor, etc. but the polarity must be correct or you risk the possibility of false triggers.

Higher voltages may be used as long as the power used by the internal 1.5K resistor does not exceed 1/4W. Here are some resistor values you can use in series with pin 1, to trigger from voltages higher than 12V:

12V to 16V = 2.7K
16V to 26V = 5.1K

Additional values can be calculated from:

Resistor (ohms) = (Input Voltage) x 357 - 1893

Pins 3 and 4 are the relay, which can handle 2A @ 28VDC. It is good for 100,000 cycles at maximum load, 100 million when unloaded. The camera can close or open this relay to turn on lights or other external devices. For example, you could unlock a door after seeing who rang.

The relay is also rated for 0.5A @ 125VAC, however it should never be used to directly control AC voltages from the wall outlet. It will wear out rapidly and may result in sparking with risk of fire. Switching mechanisms designed for controlling wall outlet power, which can be triggered from a low DC voltage, are available.

3.17 Weather Station

StarDot offers an optional weather module (AUX-WX2) that plugs into the back of NetCam SC. It's a great way to display the current temperature, humidity and barometric pressure. To view the weather data, add one or more of the markup tags in your overlay text:

`${C}`	Degrees in Celsius
`${F}`	Degrees in Fahrenheit
`${HUM}`	Humidity Percentage
`${MB}`	Millibars
`${HGIN}`	Inches of Mercury
`${HGMM}`	Millimeters of Mercury

Example: `${F}°F ${HUM}%% ${HGIN} in.`

POLL WEATHER DATA

Enable this option to have NetCam poll the weather data.

Model

Select model of weather station. WX2 is the newer model.

Connection

Select which serial port the weather station is connected to. NetCam SC only has one serial port, S1.

Altitude

This is an optional setting. Specifying your altitude adjusts the barometric pressure for a sea level reading.

Temperature Offset

This is an optional setting. A positive or negative number can be added to or subtracted from the current temperature. The offset is in Celsius and a decimal value is allowed.

Examples: `0.5` or `-1`

Humidity Offset

This is an optional setting. A positive or negative number can be added to or subtracted from the current humidity. Only positive and negative integers are allowed.

Examples: `3` or `-2`

Chapter 4 Imaging Tips

As is the case with any camera, whether digital or film-based, steps can be taken that will great improve image quality. NetCam SC is no exception to this rule. The following tips will help you achieve the best possible images with NetCam SC.

4.1 Lighting

Lighting is the single most important factor in capturing quality video. Lighting for NetCam SC can divided into two categories: outdoor and indoor.

Outdoor Lighting

In most outdoor imaging situations, you do not have much control over the lighting since most of your lighting obviously comes from the sun. However, you do have control over the lens settings and the positioning of NetCam SC. If you have an auto iris lens, you can ignore the iris section, since the iris is controlled automatically by NetCam SC.

The Iris

The first thing to consider with outdoor lighting is the lens iris. The iris is an adjustable ring that controls the size of an aperture inside the lens barrel. The smaller the iris, the less light that reaches the image sensor. The bigger the iris, the more light that reaches the image sensor.

With a manual iris lens, it is up to you to set the iris accordingly. If your imaging requirements are primarily for daylight only (and night shots are not a priority), you can afford to set the iris to a smaller size. A small iris provides better image quality and helps prevents permanent damage to the image sensor.

If your imaging requirements require both day and night video, your only choice is to open the iris so you can see at night. A large iris yields a shallow depth of field, which means not everything will be as clear and focused as a small iris setting. This may also lead to premature and permanent “burn-in” or tinting of the pixels, especially if the camera is pointing directly into the sun.

The Sun

If possible, aim NetCam SC so that it never points directly into the sun. The best direction is north or south. If you must point the camera in a western or eastern direction, try to get as little sky as possible in the image. What you want to avoid is direct sunlight -- as with any camera, or your eyes for that matter, looking into the sun produces some of the worst images. It may also “tint” the image sensor over time, even with the iris set properly.

There are certain imaging factors that are not controllable. Depending on where the sun travels in relation to the camera, you may find that images look better in the morning than the afternoon or vice versa. This is just the reality of lighting and is normal.

The Sky, Backlighting and Dynamic Range

One thing you can do to control the quality of your images is to reduce the likelihood of backlighting. Backlighting occurs when the background of an image is significantly brighter than the foreground. One example is a group of buildings in front of a bright sky. Depending on the difference in brightness between the buildings and the sky, the buildings can become a dark silhouette against the sky. Most cameras, as well as the human eye, are unable to capture details in both the dark foreground and the bright background at the same time. Dynamic range is the term used to describe the amount of detail a camera is able to capture in both dark and light areas at the same time. NetCam SC has great dynamic range, but as is the case with most cameras, it has its limits.

Here are a few suggestions for reducing backlighting:

- Point NetCam SC so little or no sky is visible in the image.
- If you want sky in the image, point NetCam SC to the north (or south).

Indoor Lighting

The biggest advantage that indoor lighting offers is control. Unlike outdoor lighting, there is no need to worry about a travelling light source or a strongly backlit sky. However, that doesn't mean indoor lighting does not have its challenges. Here are some suggestions for improving indoor imaging.

- If light is limited, open the lens iris all the way.
- Avoid pointing the camera at regions with white walls in the background as this may produce an undesired backlighting effect.
- Avoid pointing the camera toward a window.
- If possible, avoid mixed light sources. For example, a room with both fluorescent and halogen lights will illuminate the room with different color temperatures, which will be visible in the NetCam SC images.

4.2 Image Processing Options

The images produced by NetCam SC are processed and compressed inside the camera. Many options that affect the quality of the image are available on the Image Properties Page -- the important ones are listed here (for a complete list, see Chapter 2.1).

Brightness - This controls how the bright the auto exposure will adjust the image. When auto exposure is enabled (which it should be, especially when doing outdoor imaging), this is the main control you will need to adjust to increase or decrease the overall brightness of the live images. If your images are coming out dark during daylight (or indoor lighting), increase this value.

Saturation - This value represents the amount of color in the image. The higher the number, the more the saturated the colors become. The default value works well in most cases. If you do want more color saturation, increase the value by 10 or 20. Anything higher may start to produce undesired color effects.

JPEG Quality - A value between 70 and 80 works well in most cases. The compression artifacts are minimal and the file size small. While increasing the quality will result in a slightly clearer image (less JPEG compression artifacts), the significantly increased file size hardly makes it worthwhile, especially when the quality is set to 90 or higher. Conversely, if you'd like images to download/upload faster for viewers with dial-up Internet connections, you can reduce the JPEG quality which decreases the file size. A value of 50 still results in good looking images at a very small file size.

Chapter 5 Lenses

The Focus Ring

In most packages, NetCam SC ships with a pre-focused lens. Most lenses available for NetCam SC also have a focus ring which allows you to focus the lens for a closer subject. The focus ring may be marked in meters:

0.2m -- 0.3 -- 0.4 -- 0.5 -- 1.0 -- ∞

The ∞ stands for infinity. Turning the focus ring to 0.5 meters will yield a focus of half a meter. Turning it back to the infinity symbol will yield an infinite focus again.

Some lenses will not have the numerical markings -- they may be marked only with "near" and "far". The "far" setting is infinity and the "near" setting is the closest the lens will be able to focus, which varies from lens to lens.

The Iris Ring

Many lenses available for NetCam SC come with a manually adjustable iris ring. In indoor lighting situations, you will *usually* want the iris open to its fullest position. In outdoor lighting, you may want to set the iris set to a smaller size. The iris ring is usually marked in *f*-stops:

1.3 -- 4 -- 8 -- 16 -- C

The C stands for closed. In this example, the 16 setting is the smallest marked iris opening and 1.3 is the largest. You can set the iris to settings in between the marked numbers (setting it between 16 and C would result in a setting closer to *f*22, which is even smaller than *f*16).

Some lenses do not contain numerical iris markings, but will be marked with "open" and "close". You will need to look in the lens to see the size of the iris when placing NetCam SC outdoors, or you can evaluate the live video when adjusting the iris.

Changing Lenses

Changing lenses sometimes requires a back focus adjustment of the new lens. Back focus is the adjustment of the chrome ring that the lens is screwed into. Follow these steps when replacing a lens.

1. Unscrew the original lens from the chrome back ring and completely remove it.
2. Determine if your lens is C-Mount or CS-Mount.

   The only difference between a C-Mount lens and CS-Mount lens is the C-Mount lens requires a 5mm spacer between the lens and

the chrome back-focus ring.

3. Screw the new lens (with attached spacer if the lens is C-Mount) into the chrome back focus ring on the camera. Continue turning until the lens is a securely attached.

4. Monitor the live video either via the analog BNC video output or with a web browser.

5. Open the lens iris all the way and adjust the focus ring until you see a clear image. If it's a varifocal lens, you may need to adjust the focal length ring (the zoom level).

6. If you are unable to see a clear image using only the rings on the lenses, double check if your lens is C or CS-mount. Remember, a C-mount lens requires a 5mm deep spacer ring between the lens and the camera. A CS-mount lens does not require a spacer. If you still cannot achieve a clear focus, you may need to adjust the back focus ring (steps 7-10).

7. Use a small Allen or hex wrench to loosen the back focus set screw on the bottom and/or top of the camera.

8. While watching the live image turn the entire lens assembly (lens, optional spacer, and chrome back focus ring) counterclockwise by 1/2 turn. Make sure the individual iris and focus rings do not get turned out of position. Focus must be in the infinity position and the iris all the way open.

9. Wait a few seconds for the live image to catch up to the focus change and see if the image gets clearer or blurrier. If it looks sharper, continue turning in the same direction until you get a rough focus. If the image looks blurrier, try turning one full turn clockwise.

10. Focus on something across the room (or in distance outdoors) that has detail (i.e. lettering, a contrast-heavy pattern, etc.). Once you get a sharp focus, use the Allen or hex wrench to gently tighten the back-focus set screw. Do not overtighten.

Troubleshooting Guide

The StarDot Tools software does not list NetCam SC on my local network and/or is not accessible via its IP address.

1. Double-check all cable connections and make sure NetCam SC's network cable is plugged into an active Ethernet hub, switch or router. Make sure NetCam SC's power LED is on (amber on boot-up, then green).
2. Connect NetCam SC to a PC's serial port with the included null modem cable to verify network settings with the StarDot Tools software.

NetCam SC is slow to respond on a web browser.

1. If you have dial-up Internet connection, this may be normal.
2. Try the various view modes, pull, push and DirectX.
3. Set the JPEG quality to 70 or below. The higher the JPEG quality, the bigger the image file size, with very little improvement in image quality.

Images are not uploading to FTP server.

1. Double check all settings including hostname, username, password and path by using third party FTP client software (the command prompt FTP in Windows is a good test).
2. Try using an IP address in the hostname, or double check your DNS settings. For dial-up NetCam SC, do not use an IP address, use a hostname.
3. Try turning on the advanced FTP options "Delete Before Rename" and "IIS 4.0"
4. Telnet to NetCam SC and type `ftpscript ftp0.scr` and press Enter. Watch the results for errors.

Technical Support

Technical support for NetCam SC customers is available directly from StarDot Technologies. Answers to most questions can be found at our web site at http://www.stardot.com.

Technical Support and Software/Firmware Downloads

http://www.stardot.com/sc

Technical Support via E-mail

help@stardot.com

Technical Support via Phone

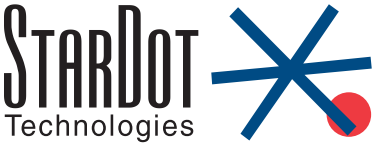
(714) 228-9282, 8AM - 5PM PST, Monday-Friday

Specifications

TECHNICAL SPECIFICATIONS	
Image Sensor	2592x1944 (5MP) Micron 1/2.5" RGB Frame Transfer CMOS
Sensitivity	0.3 LUX Color (with f1.2 iris), 0 LUX in IR mode (w/ IR illuminator)
Exposure	Auto exposure with brightness adjustment and grid exposure selection or manual exposure (1/48,000 second ~ 1.3 seconds)
Imaging Features	Auto/manual color balance (including skew override), contrast enhancement (haze subtraction, gamma correction) and sharpening
Image Compression	Industry Standard JPEG and Motion-JPEG (adjustable quality/compression)
Frame Rate	12 FPS ~ 30+ FPS, depending on resolution
Typical File Sizes	320x240 (8~20KB) 640x480 (25~70KB) 1296x960 (50~200KB) 2592x1944 (150-300KB)
Network Connection	1 x 10/100-baseT Ethernet, PoE (802.3af)
Network Protocols Supported	TCP/IP, HTTP, FTP, DHCP, PING, TELNET, DAYTIME, NTP, SMB, NFS
Serial Connection	1 x RS-232 Ports, DB9, up to 115.2Kb/sec
I/O Connectors	1 x Fully Isolated Digital Alarm Input 1 x Fully Isolated Relay, 28VDC 2A or 125VDC 0.5A
Internal Operating System	uClinux
Security	Separate password-protected user accounts for administering the server and viewing the images, additional user accounts can be added
Operating Temperature	-40°F to +120°F (-40°C to +49°C)
Dimensions	3.23" wide (82 mm) x 2.25" high (57 mm) x 4.4" long (112 mm), BNC adds 0.7" to length
Weight	14 ounces (397 grams)
EMI Approval	FCC Class A, CE (EN55024/1998, EN55022/1998)
Power Requirements	PoE (48VDC) or 10VDC - 20VDC (500mA@12V) or 24VAC

FCC STATEMENT OF COMPLIANCE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.



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